



United States Department of the Interior



FISH AND WILDLIFE SERVICE
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Ms. Kathleen Harder
Regional Water Quality Control Board, Central Valley Region
1120 Sun Center Drive, #200
Rancho Cordova, California 95670-6114

Subject: Comments on the NPDES Permit Renewal Issues: Aquatic Life and Wildlife
Preservation, Sacramento Regional County Sanitation District, Sacramento
Regional Wastewater Treatment Plan

Dear Ms. Harder:

The U.S. Fish and Wildlife Service (Service) submits these general comments on the California Central Valley Regional Water Quality Control Board's (Regional Board) issue paper, *Aquatic Life and Wildlife Preservation Sacramento Regional County Sanitation District, Sacramento Regional Water Treatment Plant* (Renewal Issues document). The Service has concerns regarding fish and wildlife considerations in development of the draft National Pollution Discharge Elimination System (NPDES) permit for the Sacramento Regional Water Treatment Plant (SRWTP). Regional Board staff member Kathy Harder requested comments from the Service on May 6, 2010. We anticipate providing more extensive comments to the Regional Board this fall during the formal comment period on the draft NPDES permit.

The Renewal Issues document focuses on components of the Sacramento Regional Wastewater Treatment Plant (SRWTP) NPDES permit relevant to the protection of aquatic life and wildlife preservation beneficial uses. To assist with the Service's comments, two other documents were reviewed: the "*Antidegradation Analysis for Proposed Discharge Modification for the Sacramento Regional Wastewater Treatment Plant*" prepared by Larry Walker Associates for the SRWTP, dated May 20, 2009; and the "*Thermal Effects of Sacramento Regional Wastewater Discharges on Migrating Fishes of the Sacramento River*" prepared by Robertson-Bryan, Inc., dated February 1, 2005.

Our primary concern focuses on ecosystem-level effects of the SRWTP within the Sacramento River and Sacramento-San Joaquin Delta (Delta). Emerging research supports concern about the form and quantity of anthropogenic nitrogen in the Delta, especially ammonia. The SRWTP is a significant contributor of ammonia to the ecosystem. Ammonia is toxic to zoo- and

phytoplankton at very low levels and ammonium inhibits nitrogen uptake by phytoplankton reducing energy availability at the base of the Delta food web.

Background

The County Sanitation District (Permittee) seeks renewal of the SRWTP NPDES permit which expired in 2005. SRWTP is a publicly owned treatment works that serves 1.3 million people in the greater Sacramento, Elk Grove, Rancho Cordova, Citrus Heights and urbanized areas of Sacramento County. The Regional Board extended the permit administratively and has begun the process for adoption of a new permit by late 2010.

The SRWTP discharges into the Sacramento River near Freeport Bridge. The facility currently conducts secondary treatment (solids removal and biological oxygen demand reduction) with chlorination disinfection and dechlorination. Treated effluent enters the Sacramento River through a diffuser at the bottom of the river. The 300-foot long diffuser is oriented perpendicular to river flow. At the point of discharge, the Sacramento River is influenced by tidal action and can flow in a reverse direction. During these times, the SRWTP diverts its discharge to emergency basins. The Water Quality Control Plan for the Sacramento and San Joaquin basins designates the following beneficial uses for these water bodies: warm and cold fresh water habitat (WARM and COLD), wildlife habitat (WILD), migration of aquatic organisms (MIGR), and spawning, reproduction and/or early development (SPWN). The facility discharges at a permitted rate of up to 181 million gallons per day (mgd). The Permittee is requesting an increase to 218 mgd in the new permit to accommodate future growth. This 37 mgd increase would represent a 20% increase in discharge from the SRWTP.

The Sacramento River at Freeport is within the designated critical habitat for 5 federally-listed fish species including winter- and spring-run Chinook salmon (*Oncorhynchus tshawytscha*), steelhead (*O. mykiss*), delta smelt (*Hypomesus transpacificus*) and green sturgeon (*Acipenser medirostris*). Operation of the SRWTP may also affect wildlife species, including those known to feed on Central Valley fishes like the listed California Least Tern (*Sternula antillarum brownie*) and Giant Garter snake (*Thamnopsis gigas*). Our comments in this early response letter will focus on the effects of the permit on fish and wildlife with emphasis on delta smelt.

The range of delta smelt extends from San Pablo Bay upstream to about Verona on the Sacramento River, though the majority of the population occupies the portion of the range extending from western Suisun Bay/Marsh to about the city of Sacramento on the Sacramento River. Formerly abundant, the delta smelt population has declined, especially since the early 1980's resulting in its listing as threatened in 1993. Reasons for its decline include changes in outflow from the Delta, entrainment losses to water diversions, changes to food organisms, toxic substances, disease, competition and predation, and loss of genetic integrity (USFWS 1995).

Delta smelt enter the Sacramento River and Deep Water Ship Channel from late December to June to spawning in temperatures between 12-18°C. Spawning on the mainstem of the Sacramento River may occur particularly during years of low freshwater discharge. Delta smelt critical habitat in the Sacramento River extends north to the confluence with the American River. Pre-spawning adults could be expected in the vicinity of the city of Sacramento from the latter part of December through June. Some larvae could be expected in the vicinity of the city of

Sacramento during February-June. During the larval stage delta smelt are the most vulnerable to zones of poor water quality or high water temperature due to their reduced mobility.

Comments

Issue 1- Proposed mixing zones and dilution for Aquatic Life Criteria

The Service is concerned about the cumulative effects of multiple contaminants in the Sacramento River in the vicinity of the outfall, specifically for the passage of migrating adult delta smelt and their progeny. Fish passing through the discharge plume face reduced dissolved oxygen concentration, increased thermal stress and exposure to ammonia and copper; two substances to which toxicity tests have shown young delta smelt are very sensitive. Studies have also identified synergistic toxicity for copper and ammonia in the SRWTP discharge (Werner 2009). Even if all of the water quality parameters are within identified limits, there is concern that combined they could produce synergistic effects with increased toxicity for delta smelt and their food organisms.

We are also concerned about potential aquatic life attraction impacts from the discharge plume. Various species can be drawn to discharge plumes for various reasons, including feeding and temperature and flow refuge. This attraction can result in impacts from related effluent toxicity and predation. The discharge area's identity as a popular fishing location also suggests an association between the discharge plume and possible predator attraction. If created, an area of higher predation associated with operation of the SRWTP would be of particular concern for delta smelt, and juvenile and larval fishes of all species. We recommend the Permittee evaluate predation in the area around the outfall to determine if its operation increases predation.

The outfall at Freeport is within the critical habitat of 5 federally-listed species. Given concerns about synergistic toxicity of effluent and the potential for discharge plume attraction, we recommend that water quality criteria be met at the discharge point and that acute and chronic mixing zones not be permitted. If future studies show that effluent discharge does not negatively impact aquatic biota and beneficial uses can be maintained, then appropriate mixing zones could be implemented in the future.

Issue 2 - Ammonia

Existing information indicates that the SRWTP discharge does not result in events of acute or chronic ammonia concentrations outside the mixing zone (Foe et al, 2009; Mueller-Solger 2009). Summer ammonia increases are predicted to be less than 0.01 mg/L -N at the proposed discharge of 218 mgd. The antidegradation analysis identifies "moderate increases" in winter ammonia concentrations with the proposed discharge increase (15-29%).

Increased loading of ammonia from the SRWTP has occurred in the Sacramento River and the Delta since 1995 (Jassby 2008). Ammonia loading in the Delta may be inhibiting nitrogen uptake by phytoplankton throughout delta smelt's habitat, reducing energy availability at the base of the Delta food web (Dugdale 2007; Jassby 2008; Glibert 2010). Recent studies suggest that existing EPA criteria when converted to unionized ammonia may not be protective of ammonia sensitive species in the Delta, specifically delta smelt, both acutely when pH equals or exceeds 8.3 and chronically depending on pH, temperature and conductivity (Werner 2009). We recommend that the Regional Board and the Permittee work to reduce ammonia discharges and

to initiate studies to determine the fate and transportation of nitrogen discharged by the SRWTP and its affect on survival of fish species like delta smelt and the food web on which they depend below the outfall in the Sacramento River and throughout the Delta.

The NPDES permit should include expectation of compliance with EPA's 1999 Ambient Freshwater Criteria for Ammonia. The Service conceptually supports EPA's 2009 Draft ambient freshwater ammonia criteria which will provide new criteria needed for the protection of freshwater mussels. Once promulgated by EPA, these criteria should be included in the SRWTP permit to better protect freshwater mussels in the Sacramento River and the Delta. When information becomes available, more stringent site-specific criteria protective of Delta biota could replace the nation-wide criteria.

Existing compliance monitoring provides data on river water quality below the effluent discharge approximately six times per year. For the 2008-2009 reporting period no samples were taken during the delta smelt spawning season in March, April or May (Walker and Associates 2009). Unfortunately, we find the existing quantity of data insufficient to adequately assess water quality impacts on aquatic biota. We suggest the addition of continuous monitoring of ammonia, pH and temperature at sites upstream and downstream of the outfall (near and far field) to provide data on the concentrations and timing of ammonia conditions in the Sacramento River and Delta.

Issue 3 - Dissolved oxygen

Although data provided in the *Sacramento Regional Sanitation District Coordination Monitoring Program 2008-2009 Annual Report* do not show exceedences of the Basin Plan Objective of 7.0 mg/L, data collected by the California Department of Water Resources documented dissolved oxygen below 7.0 mg/L at Hood during July through December 2008. We recommend the additions of continuous dissolved oxygen monitoring upstream and downstream to identify SRWTP's contribution to oxygen demand as well as the timing and extent of the oxygen deficiencies in the Sacramento River. This monitoring data will assist the Permittee in their efforts to model oxygen demands of their discharge and comply with the Basin Plan Objective.

Antidegradation analysis provided by the Permittee identified "negligible decreases" in dissolved oxygen specifically in winter with the increased discharge to 218 mgd. Any effort to reduce ammonia would not only benefit aquatic life by reducing direct exposure to fish and their supporting food web, but would also provide benefit through reduction of effluent-associated oxygen demand. The Service is concerned that the requested increase in permitted discharge will produce increased oxygen demand in the river resulting in lower dissolved oxygen levels downstream of the outfall particularly during winter with lower river discharge and when delta smelt typically increase their use of the affected river reach. The Regional Board and the Permittee need to address how the future permitted discharge will maintain the Basin Plan objective with the proposed increased effluent discharge.

Issue 4 - Thermal conditions

The Permittee has requested an exception to the *Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California* (Thermal Plan) requirement 5.A.(1)b. Thermal exceptions were present on their

previous permit. The Thermal Plan prohibits waste discharges from creating a zone of more than 1°F above natural receiving waters which exceeds 25% of the cross sectional area of a main river at any point. The expired permit allows for a 2°F exception when waters are less than 65°F. For the 2010 permit, the Permittee has requested only narrative criteria specified as “the discharge shall not create a thermal condition within the river that prevents fishes from migrating past the diffuser.” Narrative criteria are difficult to evaluate for compliance particularly in reference to fish behavior. Unless the Regional Board and the Permittee can address how compliance with acceptable thermal criteria will be determined and monitored, the Service requests that the permit require compliance with the Thermal Plan as written.

Thermal tolerances for fish are established as Critical Thermal Maxima (CTM). The CTM is the temperature for a given species above which most individuals respond with unorganized locomotion and is considered to be the lethal temperature. The CTM for adult delta smelt has been identified as 25.4°C (or 77.72°F) (Swanson et al, 2000).

It should be noted that adverse temperature effects occur to delta smelt and other fish species in the Sacramento River and the Delta before their respective CTMs are reached. Delta smelt egg survival decreases at temperatures above 15-16°C (about 60°F) and is greatly reduced by 20°C (68°F) (Bennett 2005). The CTM for juvenile Chinook salmon is about the same as delta smelt, but sublethal effects occur at temperatures over 17°C (63-65°F) (Marine and Cech 2004).

Much of the thermal analysis is relative to ambient conditions but the CTMs, other known thermal sensitivities, and seasonal movements of delta smelt, salmon, steelhead, and green sturgeon should be considered in determining an acceptable temperature regime resulting from SRWTP effluent discharge.

Issue 5 - Pyrethroid Pesticides

An increasing number of studies show the detrimental effects of pyrethroids on aquatic organisms at extremely low levels, often below detection limits. An important pathway of pyrethroids to streams is via urban stormwater runoff (Amweg 2006). Since portions of Sacramento's wastewater system are combined collection of sewage and stormwater, the Service requests that the Regional Board and the Permittee continue to pursue ways to reduce pyrethroids levels in effluent discharge.

Issue 6 - Whole Effluent Toxicity Testing

SRWTP effluent exceeded acute toxicity effluent limits 15 out of 100 bioassays from February 2008 to December 2009. These bioassays were completed using the fathead minnow (*Pimephales promelas*). An existing acute toxicity study shows that rainbow trout thresholds are more similar to delta smelt than fathead minnows. The Total Ammonia 96-hour acute LC50 was 11.2 mg/L for rainbow trout, 12 mg/l for delta smelt and 20.9 mg/l for fathead minnows (Werner 2009). The Service recommends that the Regional Board include rainbow trout in the acute bioassays to prevent underestimation of toxicity to delta smelt.

The Service recommends the addition of *Hyallolella azteca* as an addition to the WET bioassay determination in order to address issues of ammonia and synergistic toxicity. Increasing concern with impacts of effluent on invertebrates and lower levels of the food web would be addressed by the addition of more contaminant-sensitive *H. azteca* to the testing regime.

The Permittee has requested the ability to use “synthetic water” for chronic WET testing citing concerns about upstream sources of toxicity. If the purpose of WET testing is to approximate the in-river toxicity to aquatic organisms downstream of the SRWTP discharge then ambient or river water should be used. Unknown toxicity issues have been suggested for SRWTP effluent. In addition to WET testing, Toxicity Reduction and Identification Evaluations (TRE/TIE) are important tools in identifying toxic chemical groups and resolving toxicity issues in effluent. Synthetic water is appropriate for TRE/TIE studies in this circumstance. The Service recommends the Regional Board consider alternatives if the Permittee can provide additional acceptable data or justification for alternative water sources for acute and chronic WET testing. In this situation, the Service recommends that the Regional Board consider narrative limits and appropriate numeric toxicity triggers, allowing for the triggering of accelerated monitoring, monitoring frequency and TRE/TIE analysis.

Other comments

Antidegradation analysis of the proposed increase in permitted discharge is of specific concern. The document identified changes in water quality and qualified them as “slight”, “negligible” or “moderate” without identifying how the characterizations were made. Several water quality parameters whose increase would be undesirable to aquatic organisms were predicted to increase at the higher effluent discharge of 218 mgd including: ammonia, total nitrogen, nitrate+nitrite, total Kjeldahl nitrogen, total phosphorous, conductivity, and chloride. In winter, the modeled future median ammonia increases at 218 mgd were identified as 0.11 mg/L 700 ft. below the diffuser and 0.09 mg/L at Greene’s Landing/Hood (Table 5-187, Walker and Associates 2010, p. 5-279). Those incremental increases added to modeled base median concentrations predict total ammonia concentrations of 0.83 mg/L 700 ft below the diffuser and 0.40 mg/L at Green’s Landing/Hood, a 15% and 29% increase in ammonia, respectively. Our understanding of why ammonia will increase in winter is that plant operation for ammonia control will only be performed in summer. Despite cooler water and often increased discharge for dilution, a 29% increase in ammonia is a marked increase and wintertime ammonia control may be advisable.

Conclusions

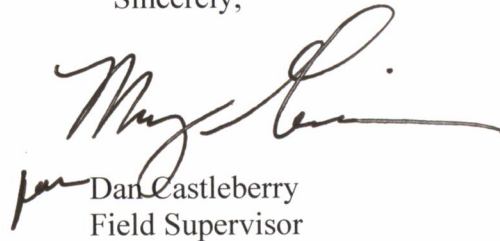
The permit must result in water quality which maintains all beneficial uses of the Sacramento River and Delta, including aquatic life and wildlife preservation. In order to meet those expectations the Service recommends:

- 1) Acute and chronic mixing zones should not be permitted unless future studies show that effluent discharge does not negatively impact aquatic biota and beneficial uses can be maintained. Particular concern exists for vulnerable larval and juveniles fishes moving past the discharge. We request discharge-related predation levels be evaluated and considered in the determination of mixing zone allowances.
- 2) Because ammonia concentrations and loading in the Sacramento River and Delta ecosystem are of significant concern, fate, transport, and ecosystem loading of the Permittee’s ammonia discharge should be determined. Continuous monitoring is needed to verify permit compliance particularly for ammonia, pH and temperature.

- 3) Oxygen demand in effluent must be managed to maintain the Basin Plan objective of 7.0 mg/L in the Sacramento River and downstream. We recommend continuous monitoring of dissolved oxygen up and downstream of the outfall.
- 4) The Permittee should actively pursue ways to reduce pyrethroid levels in effluent.
- 5) Bioassays should be conducted with appropriately-sensitive *Hyallela azteca* and rainbow trout to estimate toxicity on native, threatened and endangered river fishes and their food organisms.

We appreciate the opportunity to comment on the Renewal Issues document and provide input in development of the draft NPDES permit for the SRWTP. We look forward to the opportunity to comment on the future draft permit. If you have any questions or comments about this letter, please contact Mike Hoover of my staff at (916) 930-5639. Please include the Service's Bay-Delta Fish and Wildlife Office on your distribution list for all further notices related to the Sacramento Regional Wastewater Treatment Plant NPDES permit.

Sincerely,



Dan Castleberry
Field Supervisor

cc: Pamela C. Creedon, Executive Officer, CVRWQB
Elizabeth Sablad, Environmental Scientist, NPDES Permits, EPA Region 9

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